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(71) Applicants
Pye (Electronic Products) Limited, St. Andrew's Road, Cambridge CB4 1DP
(72) Inventor
Harold Ernest Barnes
(74) Agent
R. J. Boxall, Mullard House, Torrington Place, London, WC1E 7HD

(54) Microphone unit

(57) A microphone unit for a telephone handset includes a moisture barrier (7) between a cover plate (9) and an electret microphone (3). A sealed cavity is formed by the moisture barrier (7), an annular foam member (6), a first member (4) and the electret microphone (3). In order to equalise the air pressure between the atmosphere and the inside of the cavity the annular foam member (6) is constructed from an open cell plastics material, a suitable material being an open cell polyethylene foam.

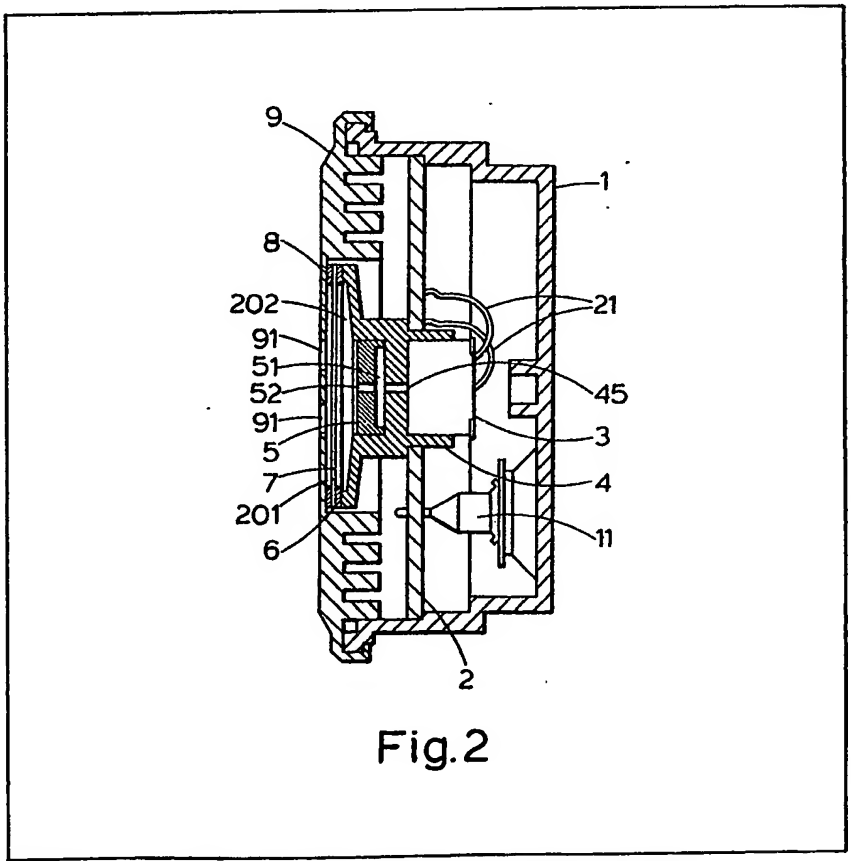

Fig.2

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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

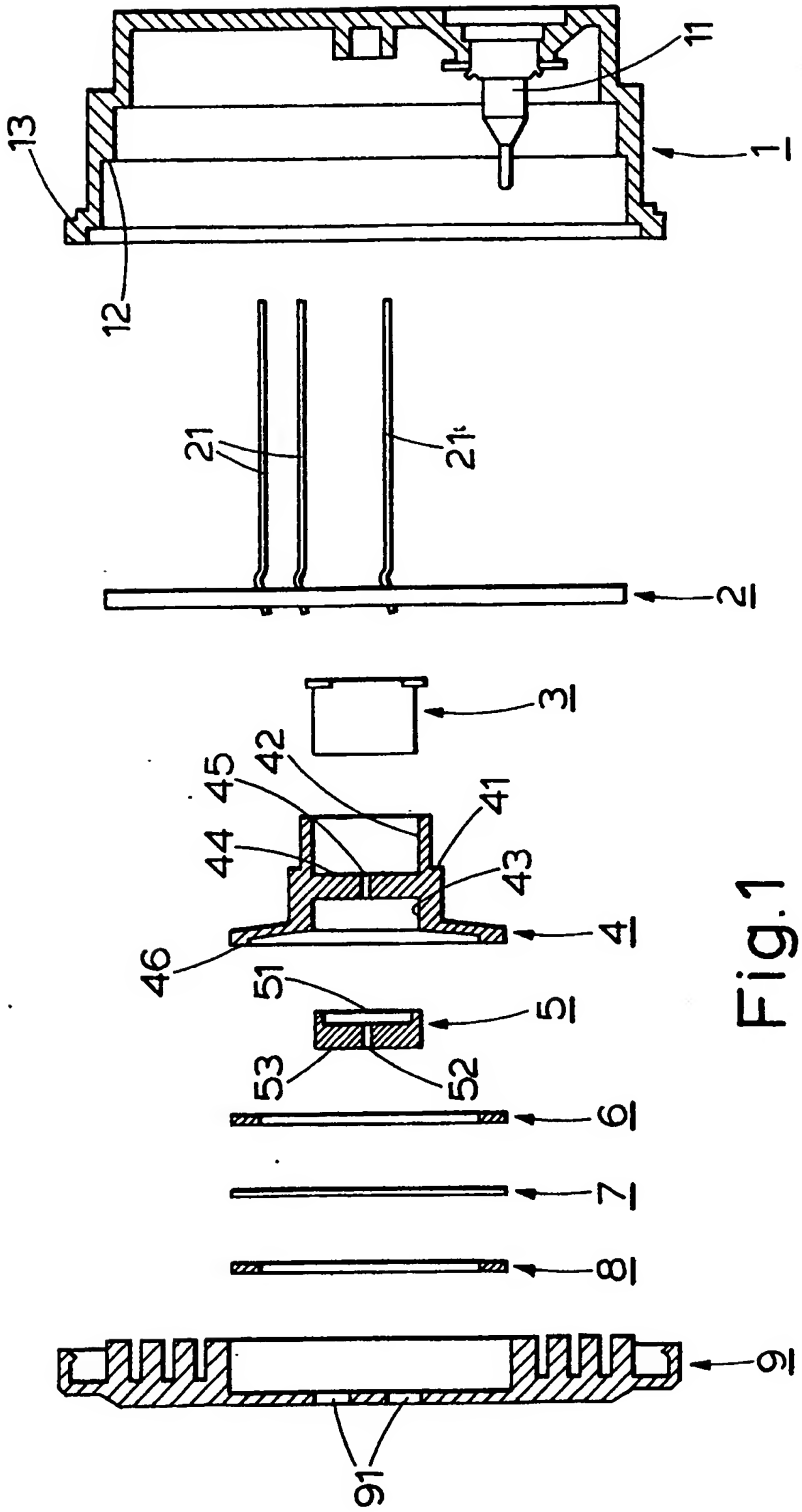

Fig.1

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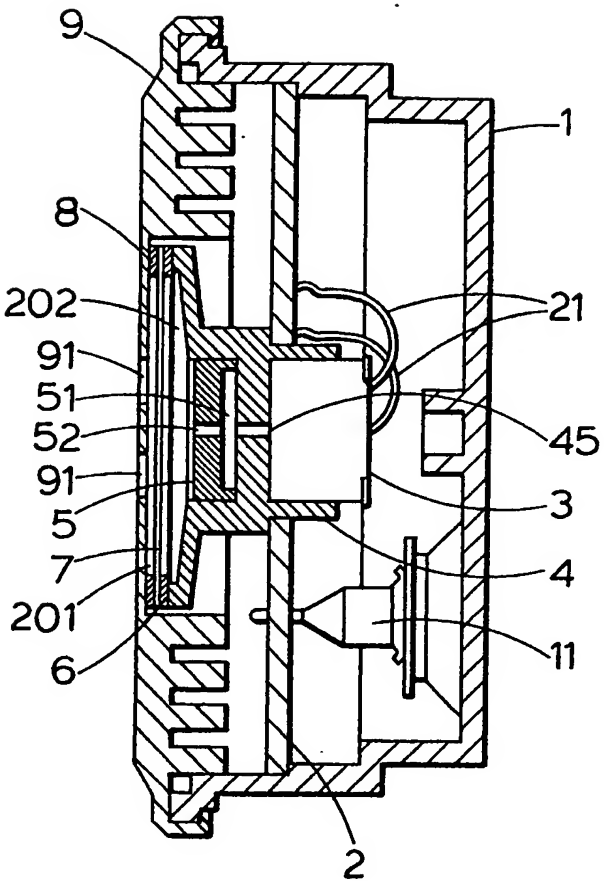

Fig.2

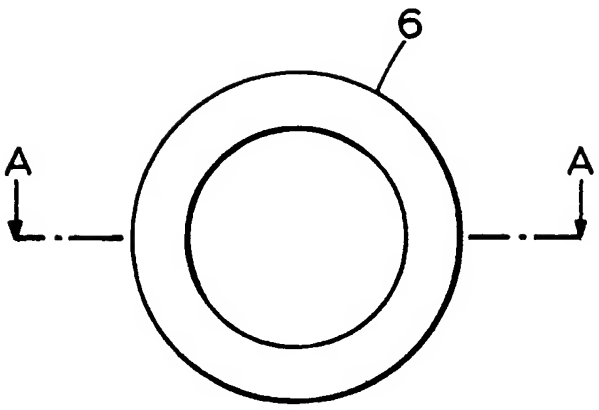

Fig. 3

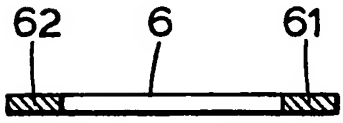

Fig. 4

SPECIFICATION
Microphone unit

The Invention relates to a microphone unit for a telephone handset including a plastics film moisture barrier between a perforated cover plate and the microphone element in which the moisture barrier is carried by a plastics foam ring sandwiched between the cover plate and the microphone element or a member carrying the microphone element.

In such a microphone unit a sealed cavity may be formed between the moisture barrier and the microphone element and in such a case it is necessary to provide means for equalising the air pressure between the inside and the outside of the sealed cavity. It is known to provide a channel between the inside and outside of the cavity by cutting a groove in the plastics foam ring to allow air to pass between the inside and outside of the cavity. This procedure has the disadvantage that an additional manufacturing step, that of cutting the groove, is required which inevitably adds to the cost of the unit.

It is an object of the Invention to provide an alternative means for equalising the pressure between the inside and outside of a cavity in a microphone unit.

The invention provides a microphone unit as described in the first paragraph characterised in that the plastics foam ring is formed from an open cell material so that air is allowed to pass into or out of a cavity formed between the film and the microphone element through the cells of the plastics foam.

By using an open cell plastics foam air is enable to leak into or out of the cavity through the structure of the foam and no further manufacturing step is required.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is an exploded cross-sectional elevation of a microphone unit for a telephone handset according to the invention,

Figure 2 is a cross-sectional elevation of a microphone unit assembled from the elements shown in Figure 1,

Figure 3 is a plan view of the plastics foam member used in the microphone unit shown in Figure 2, and

Figure 4 is a cross-section on line A—A of the plastics foam member shown in Figure 3.

As shown in Figure 1 the microphone unit comprises a case 1, a printed circuit board 2 carrying an amplifier circuit, an electret microphone unit 3, a first member 4, a disc shaped plug member 5, a first annular foam member 6, a circular melinex diaphragm 7, a second annular foam member 8, and a cover 9.

The case 1 is circular in plan and is formed as a polypropylene injection moulding. The case 1 carries two terminals, one of which is shown at 11, and has a shoulder 12 against which the printed circuit board 2 locates.

The printed circuit board has a central circular aperture in which the first member 4 locates with a shoulder 41 abutting against the surface of the printed circuit board. The electret microphone 3 is located in a circular recess 42 in the member 4 and thus when assembled projects through the printed circuit board 2 towards the base of the case 1. Three leads 21 which are attached to the printed circuit board 2 at one end are soldered to terminals on the electret microphone 3. The first member 4 has a further circular recess 43 aligned with the recess 42 and separated from it by a web 44 which is provided with a central aperture 45. The plug member 5 is a force fit in the recess 43 and has a circular recess 51 and a central aperture 52. The web 44 and a plug 5 form opposed walls of a cavity consisting of the volume of the recess 51.

The annular foam members 6 and 8 are formed from an open cell polyethylene plastics foam and are provided with a pressure sensitive adhesive on each face so that when the microphone unit is assembled the melinex diaphragm is sandwiched between the foam members 6 and 8 which are in turn sandwiched between the cover 9 and a flange 46 on the first member 4. The cover 9 is formed by injection moulding, has a number of apertures 91 through which sound waves pass and snap fits over a shoulder 13 on the case 1.

Figures 3 and 4 show the annular foam member on an enlarged scale. Two opposed faces 61 and 62 of the foam are provided with a pressure sensitive adhesive. The foam is of an open cell material and may be, for example, a polyethylene foam. The pressure sensitive adhesive on faces 61 and 62 may be an acrylic adhesive.

Figure 2 shows the assembled microphone unit and as can be seen from this figure the path for sound waves to the electret microphone unit 3 is through a series of cavities and apertures. Apertures 91 in the cover 9 lead to a cavity 201 formed between the cover 9 and the melinex diaphragm 7. Sound pressure waves will cause the disc 7 to vibrate and thus transmit the pressure variations to a further cavity 202 formed between the diaphragm 7 the flange 46 on the first member 4 and an outer face 53 of the disc shaped member 5. These pressure variations are transmitted through the aperture 52 in the member 5 into the cavity 51 and through the aperture 45 to the electret microphone 3. This arrangement of cavities, diaphragm and apertures forms an acoustic filter which is tuned to provide a response which falls rapidly above about 3.5 KHz. This characteristic is useful in telephone communications as it reduces the requirements for further filtering of the audio signal to restrict it to the available bandwidth. The use of an open cell foam for the annular member 6 allows pressure equalisation between the cavity 202 and the atmosphere through the cell structure of the foam. By this means the provision of a separate pressure equalising channel is rendered unnecessary thus saving an additional manufacturing step.

It would be possible to use other open cell plastics foam materials for the member 6 the actual material chosen may depend on the environment in which the unit is to be used and the cost or availability of specific materials. The member 6 may be attached to the member 4 and/or the cover 9 by means other than a pressure sensitive adhesive, for example by being trapped between co-operating members.

CLAIMS

1. A microphone unit for a telephone handset including a plastics film moisture barrier between a perforated cover plate and the microphone element in which the moisture barrier is carried by a plastics foam ring sandwiched between the cover plate and the microphone element or a member carrying the microphone element, characterised in that the plastics foam ring is formed from an open cell material so that air is allowed to pass into or out of a cavity formed between the film and the microphone element through the cells of the plastics foam.

2. A microphone unit as claimed in Claim 1 in which the plastics foam is an open cell polyethylene foam.

3. A microphone unit as claimed in Claim 1 or Claim 2 in which the foam is attached to the cover and microphone element or carrying member by a pressure sensitive adhesive.

4. A microphone unit substantially as described herein with reference to the accompanying drawings.

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